

WHAT IS CLAIMED IS:

1. A method for the extraction of linear features from digital imagery comprising the steps of:

providing a digital image;

providing a multi-layer database

initializing a parameter domain;

successively applying the Radon transform on each position in the parameter domain;

for each position in the parameter domain:

- finding the coordinates of the nearest pixel in the digital image;

- determining the numerical value of the found pixel; and

- populating the layers of the provided database in accordance with the determined numerical value of the found pixel;

analysing the data of the database; and

generating an output image by restoring the lines detected in the analysing step.

2. A method for the extraction of linear features as recited in claim 1, wherein the multi-layer database providing step includes providing a multi-layer database having at least three layers; a first layer used to contain the coordinates of the zero value pixels; a second layer used to contain the coordinates of the non-zero value pixels and a third layer used to contain the values of the non-zero value pixels.

3. A method for the extraction of linear features as recited in claim 2, wherein, in said populating step:

the coordinates of the found pixel are stored in the first layer when the numerical value of the pixel is found to be zero;

the coordinates of the found pixel are stored in the second layer when the numerical value of the pixel is found to be non-zero;

the numerical value of the non-zero pixels is stored in the third layer.

4. A method for the extraction of linear features as recited in claim 1, wherein the multi-layer database providing step includes providing a multi-layer database having at least five layers; a first layer used to contain the coordinates of the zero value pixels; a second layer used to contain the coordinates of the non-zero value pixels; a third layer used to contain the values of the non-zero value pixels; a fourth layer used to contain the values of the zero value pixels and a fifth layer used to contain the accumulation of the non-zero pixel values.

5. A method for the extraction of linear features as recited in claim 4, wherein, in said populating step:

the coordinates of the found pixel are stored in the first layer when the numerical value of the pixel is found to be below a predetermined threshold;

the coordinates of the found pixel are stored in the second layer when the numerical value of the pixel is found to be above the predetermined threshold;

the numerical value of the pixels having a value which is above the predetermined threshold is stored in the third layer;

the numerical value of the pixels having a value which is below the predetermined threshold is stored in the fourth layer; and

the accumulation of the numerical value of the pixels that have a numerical value which is above the predetermined threshold is stored in the fifth layer.

6. A method for the extraction of linear features as recited in claim 1, wherein said data analysing step includes the substep of finding the endpoints of each linear feature to be extracted.

7. A method for the extraction of linear features as recited in claim 6 further comprising the step of storing the endpoints found in a database which is used in the output image generating step.

8. A method for the extraction of linear features as recited in claim 1, further comprising the step of providing the minimum and maximum length of the lines to be detected.

9 A system for the extraction of linear features from a digital image and for generating a corresponding output image comprising:

a controller provided with an input designed to receive a digital image and an output designed to provide a corresponding output image; said controller containing a multi-layer database; said controller being so configured as to:

initialize the discrete parameter domain;

successively apply a Radon transform on each position in the parameter domain;

for each position in the parameter domain:

- find the coordinates of the nearest pixel in the digital image;
- determine the numerical value of the found pixel; and
- populate the layers of the provided database in accordance with the determined numerical value of the found pixel;

analyse the data of the database; and

generate an output image by restoring the lines detected in the analysing step.

10. A system for the extraction of linear features as recited in claim 9, wherein the multi-layer database includes at least three layers; a first layer used to contain the coordinates of the zero value pixels; a second layer used to contain the coordinates of the non-zero value pixels and a third layer used to contain the values of the non-zero value pixels.

11. A system for the extraction of linear features as recited in claim 10, wherein, when populating the database, the controller is so configured as to:

- store the coordinates of the found pixel in the first layer when the numerical value of the pixel is found to be zero;

- store the coordinates of the found pixel in the second layer when the numerical value of the pixel is found to be non-zero;

- store the numerical value of the non-zero pixels in the third layer.

12. A system for the extraction of linear features as recited in claim 9, wherein the multi-layer database includes at least five layers; a first layer used to contain the coordinates of the zero value pixels; a second layer used to contain the coordinates of the non-zero value pixels; a third layer used to contain the values of the non-zero value pixels; a fourth layer used to contain the values of the zero value pixels and a fifth layer used to contain the accumulation of the non-zero pixel values.

13. A system for the extraction of linear features as recited in claim 12, wherein, when populating the database, the controller is so configured as to:

- store the coordinates of the found pixel in the first layer when the numerical value of the pixel is found to be below a predetermined threshold;

- store the coordinates of the found pixel in the second layer when the numerical value of the pixel is found to be above the predetermined threshold;

- store the numerical value of the pixels having a value which is above the predetermined threshold in the third layer;

- store the numerical value of the pixels having a value which is below the predetermined threshold in the fourth layer; and

store the accumulation of the numerical value of the pixels that have a numerical value which is above the predetermined threshold in the fifth layer.

14. A system for the extraction of linear features as recited in claim 9 further comprising an output device connected to said output of said controller to receive the output image generated by said controller.

15. A system for the extraction of linear features as recited in claim 9 further comprising an input device connected to said input of said controller to supply the digital image to the controller.

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